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Precision Measurement of the Electron/Muon Gyromagnetic Factors AYODEJI AWOBODE, University of Illinois at Urbana-Champaign — Clear, persuasive arguments are brought forward to motivate the need for highly precise measurements of the electron/muon orbital g, i.e. g_L, as a test of QED. It is demonstrated, using the data of Kusch & Foley on the measurement of (δ_S - $2\delta_L$) together with the modern precise measurements of the electron δ_S ($\delta_S \equiv g_S - 2$)), that δ_L may be a small (–0.6 x 10^{-4}), non-zero quantity, where we have assumed Russel-Saunders (LS) coupling and proposed, along with Kusch and Foley, that $g_S = 2 + \delta_S$ and $g_L = 1 + \delta_L$. Therefore, there is probable evidence from experimental data that g_L is not equal to 1 exactly; the expectation that quantum effects will significantly modify the classical value of the orbital g is therefore reasonable. It is significant that available spectroscopic data indicate that g_S and g_L are probably modified such that g_S is increased by δ_S while g_L is decreased by δ_L. Modern, high precision measurements of the electron and muon orbital g_L are therefore required, in order to properly determine by experiments the true value of $g_L - 1$, perhaps to about one part in a trillion as was recently done for $g_S - 2$.

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